

**REMARKS**

Review and reconsideration on the merits are requested.

Applicants appreciate the Examiner acknowledging receipt of a certified copy of the priority document and returning initialed copies of two forms PTO/SB/08, one filed with this application and one filed on May 26, 2004.

Applicants now turn to **DETAILED ACTION**.

Applicants affirm their election of Group I, claims 1-2. Election may be considered as without traverse.

Turning now to **SPECIFICATION** at page 4 of the Action, a new Abstract is provided.

Withdrawal of the objection to the specification is required.

With respect to **CLAIM OBJECTIONS** on that same page, and using letters A.-E. as the Examiner has used:

A., the change is made;

B., the change is made;

C., the change is made;

D., the deletions are made;

E in claim 1, line 13, the language “standard temperature and pressure” (specification, page 8, lines 19/20) is used.

Withdrawal of the objection to the claims is requested.

Prior art considered: U.S. Pat. 4,049,571 Nissen et al.

The rejection: Claims 1-2 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Nissen.

The rejection of these claims is respectfully traversed.

The Examiner's position is set forth in the Action in detail and will not be repeated here except as necessary to an understanding of Applicants' traversal which is now presented.

Applicants first address the Examiner's position that it would have been *prima facie* obvious to have optimized the zinc oxide concentration in Nissen. This overlooks the fact that even if one were to optimize the zinc oxide concentration in Nissen, one would still be optimizing within the amount of 1 to 20% of claim 8 of Nissen, which the Examiner cites. Accordingly, even if optimization is in fact the case, one of ordinary skill in the art would not be led to the minimum 30% zinc oxide concentration of claim 1 of the present application.

While Applicants may well agree with the Examiner that the Examiner's position on optimization is a viable concept, there is no suggestion in Nissen to optimize above 20% zinc oxide in Nissen to reach the *minimum* 30% by weight zinc oxide as claimed herein.

The Examiner's attention in this regard, is directed to Nissen at col. 3, line 11 et seq.:

"The *best results* are obtained when from about 0.01 to 20% of a zinc salt of a higher aliphatic carboxylic acid... are added to the solution of the zinc salt..."

See also Nissen at col. 3, line 53 et seq.:

"The content of zinc on a suitable support as described above *may be from 1 to 10%.*"

(italics added in the above).

Quite clearly there is no motivation for one of ordinary skill in the art to use higher amounts of zinc oxide in Nissen, i.e., there is no reasonable basis for the Examiner's position regarding optimization.

However, Applicants offer more detail comments on Nissen at this time.

As is quite clear from the claims herein, the amount of zinc oxide in accordance with the present invention is quite high as compared to Nissen. When the zinc oxide content is below the lower limit claimed in the present claims (30% by weight), performance is deteriorated. For example, hydrogen sulfide leakage, lower desulfurization activity, etc., occur.

Applicants respectfully submit that the Comparative Examples in the present specification establish this is the case.

Referring first to Comparative Example 3 at page 31 of the specification, 25 wt% zinc oxide was used. As explained at page 32 of the specification, during desulfurization, leakage of hydrogen sulfide to the downstream side was observed.

A similar leakage of hydrogen sulfide to the downstream side was observed in Comparative Example 5 at pages 33/34 of the specification, except in Comparative Example 5, the zinc oxide concentration was 20 wt%, exactly the same as the maximum in Nissen.

Referring to Comparative Example 7 at pages 35/36 of the specification, in that Comparative Example, 25 wt% zinc oxide was present in the catalyst. In that particular example, Applicants advise that since the content of zinc oxide was too low, desulfurization activity was insufficient.

Referring now to Example 8 at pages 36/37 of the specification, this simply illustrates the situation where no zinc oxide is present. Applicants advise that *both* desulfurization activity was too low and leakage of hydrogen sulfide occurred.

With respect to Comparative Example 6, which occurs at pages 34/35 of the specification, in that Comparative Example, the amount of zinc oxide was 25 wt%. The zinc oxide content was the same as in Comparative Example 3 and in Comparative Example 7. Leakage of hydrogen sulfide and deterioration in desulfurization activity were not observed, however, coloration of kerosene after desulfurization was observed. Applicants advise that these results can be explained as follows, further establishing that when the zinc oxide content is small as in Nissen, there are problems in catalyst performance.

The following discussion summarizes certain comparative examples where the zinc oxide content is as low as 25 wt%.

(Comparative Example 7): The desulfurization level is insufficient at a desulfurization temperature of 150°C

(Comparative Example 3): Though the desulfurization level is sufficiently high at a desulfurization temperature of 360°C, hydrogen sulfide leakage occurs

(Comparative Example 6): Though the desulfurization level is sufficiently high at a desulfurization temperature of 480°C and no leakage of hydrogen sulfide occurs, coloration of the product is observed due to the decomposition of kerosene and the formation of by-products.

Thus, it is seen that when the zinc oxide content is as low as 25 wt%, at low temperatures desulfurization is inadequate while when the temperature is elevated to cover such inadequacy,

product coloration is observed due to the decomposition of kerosene and the formation of by-products.

Considering the above, Applicants respectfully submit that if the Examiner has posed a *prima facie* case of obviousness, it has been rebutted.

Dependent claims are added to the preferred zinc oxide contents of 40-70% and 50-70% (specification, page 7); quite clearly, there is no suggestion or motivation in the prior art to modify Nissen to go to such higher zinc oxide contents, 40% being twice the zinc oxide content of Nissen which gives good results.

Withdrawal is requested.

Applicants would now like to address the limits in claim 1 regarding nitrogen monoxide adsorption and specific surface area. These limits in claim 1 read as follows:

the nitrogen monoxide adsorption of the catalyst at 1 kg/cm<sup>2</sup> (9.80×10<sup>-2</sup> MPa) and 40°C after hydrogen reduction at 360°C is 4.0 ml/g or more in terms of standard temperature and pressure, and

the catalyst has a specific surface area of from 10 to 300 m<sup>2</sup>/g.

In the Action of September 1, 2004, top of page 6 the Examiner states:

“With respect to the claimed “nitrogen monoxide adsorption” and “specific surface area”, while the reference is silent with respect to these catalyst properties, it would be expected the catalyst composition of Nissen would possess the same properties *since the catalytic components are the same* and the concentrations would be the same after the optimization of the zinc oxide concentration.” (italics added)

While Applicants, of course, disagree with the Examiner’s position regarding optimization, here they focus on the Examiner’s remaining central point that since the catalytic

components are the same properties would be the same. The Examiner is submitted as being in error on this point, as now explained.

Specific Surface Area

Specific surface area primarily depends on the type and content of the alumina in the catalyst. However, specific surface area does not necessarily become the same because the composition of the catalyst is the same. In accordance with the present application, a specific range has been chosen from a wider, possible range for specific surface area. Nissen is silent on specific surface area, and Applicants assert that simply because catalyst compositions are the same does not mean that specific surface areas are necessarily the same. Thus, the Examiner's position on inherency is incorrect.

Simply because catalyst composition is the same does not in any fashion lead to the conclusion that specific surface area would inherently be the same.

Although Applicants advise that in the International Search Report alumina-free catalyst are described, it is not seen how an alumina-free catalyst would be overly relevant to a catalyst as claimed herein which contains alumina oxide and where the catalyst has a defined nitrogen monoxide adsorption and a defined specific surface area.

Nitrogen Monoxide (NO) Adsorption

NO adsorption is a measure of the dispersed state of nickel (NO is adsorbed on nickel).

A catalyst that meets the requirement regarding NO adsorption in the claims herein can be manufactured by the co-precipitation method set forth in claim 3 or in the Examples of the present specification. Although Nissen describes that the Nissen catalyst can be manufactured

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by "co-precipitation" in the specification, Nissen offers no specific disclosure on co-precipitation even in the Nissen Examples and offers no disclosure on the dispersed state of the nickel and the NO adsorption of the nickel.

Thus, in order for the Examiner's inherency position on NO adsorption to be correct, it would seem that since the dispersed state of nickel is involved in this particular parameter, unless the prior art and the present application were to form a catalyst by the same procedure, the dispersed state of the nickel should differ and, accordingly, the NO adsorption of the catalysts should differ, i.e., would not necessarily be the same.

Thus, on the NO adsorption limit of the claims herein, Applicants respectfully submit that the Examiner has not carried his burden of proof regarding inherency.

For the above reasons, withdrawal of all objections and all rejections is requested.

Respectfully submitted,



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